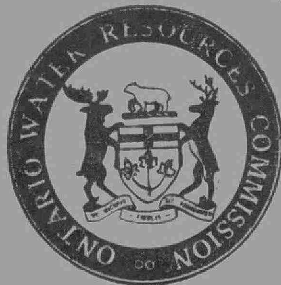


CA2 ON
WR 610
1970
P27

Peterb.
con



O.W.R.C.
Water Pollution
Survey

THE
ONTARIO WATER RESOURCES
COMMISSION



WATER POLLUTION SURVEY

of the

CITY OF PETERBOROUGH

1970

Copyright Provisions and Restrictions on Copying:

This Ontario Ministry of the Environment work is protected by Crown copyright (unless otherwise indicated), which is held by the Queen's Printer for Ontario. It may be reproduced for non-commercial purposes if credit is given and Crown copyright is acknowledged.

It may not be reproduced, in all or in part, for any commercial purpose except under a licence from the Queen's Printer for Ontario.

For information on reproducing Government of Ontario works, please contact ServiceOntario Publications at copyright@ontario.ca

CA20N
WR 610
1970
P27

THE
ONTARIO WATER RESOURCES
COMMISSION
Report on a
Water Pollution Survey
of the
CITY OF PETERBOROUGH
in the
COUNTY OF PETERBOROUGH
DIVISION OF SANITARY ENGINEERING
DISTRICT ENGINEERS BRANCH
1970

WATER POLLUTION SURVEY

of the

CITY OF PETERBOROUGH

INDEX

PAGE NUMBER

INTRODUCTION	1
PREVIOUS SURVEY	1
GENERAL	2
CITY OF PETERBOROUGH	2
WATER USE	2
WATER SUPPLY	3
SEWAGE WORKS	3
SEWAGE PUMPING STATIONS	4
INDUSTRIAL WASTE DISPOSAL	4
SAMPLING PROCEDURE	6
SAMPLE RESULTS	6
SUMMARY	9
RECOMMENDATIONS	10

APPENDICES

LABORATORY RESULTS - Tables 1 to V
SIGNIFICANCE OF LABORATORY ANALYSES
MAP OF THE CITY OF PETERBOROUGH

REPORT ON A
WATER POLLUTION SURVEY
of the
CITY OF PETERBOROUGH

INTRODUCTION

A water pollution survey of the City of Peterborough was performed during the fall of 1968 with additional investigations and sampling being conducted in August and October 1969. The report also includes 1968 and 1969 monthly laboratory results of monitoring stations at points on the Otonabee River upstream and downstream from the City. Recommendations are made pertinent to the findings of these investigations. A map of Peterborough showing the locations of the sampling points is appended to this report.

PREVIOUS SURVEY

In the fall of 1962, a water pollution survey of the City of Peterborough was conducted by OWRC staff. Included in the report on that survey was the following recommendations:

Officials of the City of Peterborough should undertake a comprehensive program to ensure that all contaminated flows will be excluded from the municipal storm sewer systems which discharge to the Otonabee River or its tributaries. The discharging of untreated sanitary and industrial wastes to the watercourses should not be tolerated.

The Quaker Oats Company of Canada Limited officials should take further action to ensure that only uncontaminated flows will be discharged from their premises to the Otonabee River.

These surveys form part of a program of continuing surveillance of the progress underway in the urban type municipalities to exclude all untreated or inadequately treated wastes from the watercourses.

GENERAL

Interviews were held with the following officials:

Mr. J. Hooper P. Eng., City Engineer

Mr. J. McKibben, Board of Works

Dr. R. C. Wade, Medical Officer of Health

Mr. J. Carruthers, Chief Public Health Inspector

CITY OF PETERBOROUGH

Peterborough as a major industrial, commercial and tourist centre situated on the Trent River system in the Kawartha Lakes region, has grown at the average rate of approximately 1,000 people per year since the second World War. During 1962, when the previous survey was conducted, the City, through annexation doubled its area and acquired over 5,000 people.

WATER USE

Recreation

In keeping with the City's well-founded image as a

major tourist centre, advantage was taken of a previously undeveloped area on the east side of Little Lake to create an extensive tent and trailer park. Advantage has also been taken of a previous industrial site on the west side of Little Lake to construct a large motor hotel. At the northern limits of the City a major university is taking shape in an unusual design on both banks of the Otonabee River. All three extensive undertakings display a confidence in local officials to ensure that the widely known tradition of safe waters in this area will not be misplaced.

WATER SUPPLY

The municipal water purification plant is located in the northern reaches of the City. Raw water is drawn from the Otonabee River and is afforded complete treatment, including coarse screening, flocculation, sedimentation, filtration and pre and post-chlorination. During 1967 plant capacity was increased from 10 to 15 million gallons per day.

SEWAGE WORKS

The activated sludge type sewage treatment plant has a rated design capacity of 7.2 million gallons per day based on the size of the activated sludge portion of the plant. Although average daily sewage flows through the plant have been in excess of the plant's design capacity, a combination of astute plant management together with a weaker than normal strength of sewage, has resulted in effluent quality being

maintained well within OWRC objectives. Effluent chlorination is practised in the period of May 15 to November 1, when recreational use is made of the downstream waters. In consideration of the current high daily flows and high yearly rate of increase in daily flows, plant expansion has been recommended by OWRC staff so that a satisfactory plant effluent quality can be maintained in forthcoming years. Action on this recommendation in the form of engineering studies and reports have now been authorized by the City.

SEWAGE PUMPING STATIONS

Reportedly, overflows, at the several sewage pumping stations employed in the sanitary sewer system, rarely occur. However on August 7, 1969, during a study of the sewage treatment plant by staff, an overflow to the Otonabee River was noted to occur from a sewer near the Park Street emergency pumping station. An increase in the raw sewage pumping rate at the plant was subsequently made and this corrected the problem.

The nature of the afore-mentioned point of sewage overflow and the nearby emergency pumping station are scheduled for special study in the current engineering study and report on plant expansion.

INDUSTRIAL WASTE DISPOSAL

Our Division of Industrial Wastes' continuing surveillance of industrial wastes procedures in the City of Peterborough and its liaison with the pertinent plant officials have

been instrumental in the following notable changes since the previous survey:

- the Quaker Oats plant wastes are now directed to the sanitary sewer.
- the Westclox plant wastes are now directed to the sanitary sewer.
- chrome recovery facilities were installed at the Outboard Marine (old) plant.
- Brinton Carpet Company is currently working on the final stage of a program for the diversion of all waste flows from the storm sewer to the sanitary sewer.

Conditions prevailing at storm sewer outfalls based on visual observations and laboratory sample results are attributable to the following reported practices:

Industrial wastes and cooling water flows from the Canadian General Electric plant have access to Little Lake via the Rink and Townsend Streets drains. The latter drain connects with an underground section of Jackson Creek near its mouth. An unnamed creek which discharges to the Park Street Storm sewer south of Lansdowne Street, reportedly, conveys industrial waste and cooling water flows from the Domtar plant, the Outboard Marine Company plant, the De Laval Dairy Equipment plant, the Peterborough Lumber Company plant and the A. L. Wander (Ovaltine) Company plant.

SAMPLING PROCEDURE

The location of sampling points are shown on the appended map of the City of Peterborough. Samples were collected from all known sewer outfalls having a liquid discharge.

Seasonal weather conditions prevailed during both sampling periods with freezing temperatures in 1968 and light rain and snowfalls occurring in 1969.

SAMPLE RESULTS

The laboratory results of analyses and examinations performed on the samples collected are shown in appendices to this report as follows:

Table 1A - Survey Sample Results

- Otonabee River (Including Little Lake)

1B - Monthly Monitoring Program Sample Results

- Otonabee River.

Table II - Tributaries of the Otonabee River.

Table III- Municipal storm sewer outfalls.

Table IV - Industrial waste outfalls.

Table V - Municipal sewer outfalls.

Sanitary chemical analyses on all samples were performed at our laboratories in Toronto while bacteriological examinations were arranged through the courtesy of staff of the Regional Department of Health Laboratory in Peterborough.

Otonabee River and Little Lake

Although the BOD levels in the Otonabee River and Little Lake were in general within Commission objectives throughout, significant levels of total coliform bacteria were present at several points with faecal coliforms being present, with few exceptions, at each sampling point. Appreciable phenol values were indicated at several points in the lower stretches of the watercourse.

Tributaries of the Otonabee River

For the purposes of the survey, a small brook originating in Douro Township near the old Curtis brickyard has been named Ashburnham Brook in this report.

Significant BOD levels were present in the Downey Street drain, in the lower reaches of Jackson Creek and on one occasion in Byersville Creek at Lansdowne Street west. Substantial Total and Faecal coliform counts were present in all the tributaries in the main densely populated section of the city and also in the creek that receives the effluent from the sewage works serving Woodland Acres subdivision in Smith Township. Phenols were indicated in Jackson Creek near its mouth and also in Byersville Creek at Lansdowne Street West.

Municipal Storm Sewer Outfalls

The presence of BOD values at appreciable levels in practically all of the storm sewer discharges accompanied by excessive Total and Faecal coliform contents corroborate the reports

of sanitary and possibly in some instances industrial use of the storm sewer systems. It should be noted that the flows observed at some of the storm sewer outfalls and their resultant effects on surface water quality are considered to be minimal. However, these would nevertheless be considered eligible for inclusion in an overall program of storm sewer "clean-up".

Industrial Waste Outfalls

Samples collected pertinent to the three outfalls serving the Quaker Oats plant reflect the benefits of diversion of waste flows to the city's sewage treatment plant since the previous survey. The presence of high coliform counts in the south outfall would suggest that sanitary wastes may still have access to this sewer.

An underground inspection of Jackson's Creek at Townsend Street revealed a discharge from the Kawartha car wash operation. The waste flow from this operation should discharge to the local sanitary sewer.

Municipal Sewage Outfalls

The quality of the municipal sewage treatment plant effluent is being maintained well within our objectives as is customary of this operation. The management and staff are to be commended for their efforts in this regard.

During a period of in-plant study by OWRC staff in August 1969, a sewage overflow was occurring from the sanitary sewer south of the Park Street emergency pumping station to the

Otonabee River. This occurred as a result of the malfunctioning of an indicator mechanism located at the plant. The rate of raw sewage pumping through the plant was subsequently increased, thus lowering the sewage level in the sewer and stopping the overflow.

The presence of coliform organisms in appreciable numbers in the sewage plant discharge sample of November 1968 was expected since plant effluent chlorination was not being practised during that time. To date the OWRC has not required chlorination of the plant effluent during the period of November 1 to May 15 because of the very limited downstream use made of the Otonabee River during that time.

SUMMARY

Field investigations pertinent to a water pollution survey of the City of Peterborough were performed during 1968 and the fall of 1969. This survey was conducted to determine the water quality conditions at this time and to note the changes and possible improvements during the period since the last survey. It is understood that the city has continued to grow at an orderly, but substantial, rate and that all new development has been accompanied by the provision of full services. It is nevertheless regrettable to note that only limited success has been achieved in resolving the problem of untreated or inadequately treated domestic and/or industrial waste discharging to the storm sewer system and thence to surface waters. It is understood that the municipal

officials are currently studying the needs of sewage plant expansion in order to keep abreast of development needs in the city.

RECOMMENDATIONS

City Officials should accelerate their efforts to divert all untreated or inadequately treated domestic and industrial waste flows from the storm water collection system to the municipal sanitary sewerage system.

/jkc

Prepared by: A. D. McConnell
A. D. McConnell,
Engineering Technician,
Division of Sanitary Engineering.

SIGNIFICANCE OF LABORATORY ANALYSES

Bacteriological Examination

The presence of coliforms indicates pollution from human or animal excrement, or from some non-faecal forms. It is the opinion of the OWRC that the presence of coliforms in a watercourse should not exceed 2400 organisms per 100 millilitres of water.

The Membrane Filter MF technique is now employed to obtain a direct enumeration of coliform organisms at the Department of Health Laboratories and they report both Total Coliform Organisms (TC) and Faecal Coliform Organisms (FC).

Sanitary Chemical Analyses

Biochemical Oxygen Demand (BOD)

Biochemical Oxygen Demand is reported in parts per million (ppm) and is an indication of the amount of oxygen required for the stabilization of the decomposable organic or chemical matter in the water. The completion of the laboratory test requires five days, under the controlled incubation temperature of 20° Centigrade.

The Ontario Water Resources Commission objectives for surface water quality is an upper limit of four (4) ppm.

Solids

The value for solids, expressed in parts per million (ppm) is the sum of the values for the suspended and the dissolved

matter in the water. The concentration of suspended solids is generally the most significant of the solids analyses with regard to surface water quality.

The effects of suspended solids in water are reflected in difficulties associated with water purification, depositions in streams and injury to the habitat of fish.

Nitrogen

Ammonia Nitrogen (Free Ammonia) is the soluble product in the decomposition of nitrogenous organic matter, it is also formed when nitrates and nitrites are reduced to ammonia either biologically or chemically. Some small amount of ammonia, too, may be swept out of the atmosphere by rain water.

The following values may be of general significance in appraising free ammonia content: Low 0.015 to 0.03; Moderate 0.03 to 0.10 ppm; High 0.10 or greater.

Total Kjeldahl is a measure of the total nitrogenous matter present except that measured as nitrite and nitrate nitrogens. The Total Kjeldahl less the Ammonia gives a measure of the organic nitrogen present. Ammonia and organic nitrogen determinations are important in determining the availability of nitrogen for biological utilization. The normal range for Total Kjeldahl would be 0.1 to 0.5 ppm.

Nitrite Nitrogen

Nitrite is usually an intermediate oxidation product of ammonia. The significance of nitrites, therefore, varies with their

amount, source and relation to other constituents of the sample, notably the relative magnitude of ammonia and nitrate present. Since nitrite is rapidly and easily converted to nitrate, its presence in concentrations greater than a few thousandths of a part per million is generally indicative of active biological processes in water.

Nitrate Nitrogen

Nitrate is the end product of aerobic decomposition of nitrogenous matter, and its presence carries this significance. Nitrate concentration is of particular interest in relation to the other forms of nitrogen that may be present in the sample. Nitrates occur in the crust of the earth in many places and are a source of its fertility.

The following ranges in concentration may be used as a guide. Low, has less than 0.1 ppm; Moderate, 0.1 to 1.0 ppm; High, greater than 1.0 ppm.

Phosphorus

Total Phosphorus

Total Phosphorus is a measure of both the organic and inorganic forms of phosphorus present.

Soluble Phosphorus

Soluble Phosphorus is a measure of the orthophosphate only and when subtracted from the total phosphorus gives an indication of the concentration of organic phosphorus present. That is, the

soluble phosphorus is a measure of the inorganic phosphorus present except the phosphorus in the form of polyphosphate, which however, in surface waters is usually insignificant. In-organic phosphorus in concentration in excess of 0.01 ppm may cause nuisance conditions.

Anionic Detergents (ABS)

The presence of anionic detergents as ABS is an indication that domestic waste is present. The popular use of synthetic detergents for general cleaning purposes has resulted in the incidence of residual ABS in streams. An objective, the ABS, alkyl benzene sulphonate, concentration should not exceed 0.5 ppm in water used for domestic purposes.

Phenols

The presence of phenol or phenolic equivalents is generally associated with discharges containing petroleum products, or with wastes from some industries. It is generally conceded that adequate protection of surface waters will be provided if the concentration of phenols in waste discharges does not exceed 20 parts per billion (ppb). Phenolic type waste can cause objectionable conditions in water supplies and might taint the flesh of fish.

pH

The pH value, for practical purposes, refers to acidity or alkalinity, and is a measure of intensity rather than quantity. The pH scale extends from zero (very acidic) to 14 (very alkaline), with the middle value of 7 corresponding to neutrality at 25° Centigrade. The pH of surface water should be in the range of 6.7

to 8.5.

Chromium

The maximum permissible concentration of hexavalent chromium (Cr + 6) for water supplies is 0.05 ppm. Chromium may occur in this form in waste waters from the manufacture of chromates, in chromium plating wastes and as trivalent chromium in chrome tanning liquor.

Cyanide

Cyanide in water is toxic to biological life, and toxicity concentration depending on water quality, temperature and type and size of organisms. Fish appear to be greatly affected with values as low as 0.5 ppm being reported toxic to trout. The Ontario Water Resources Commission Drinking Water objective is less than or equal to 0.01 ppm as CN.

All analyses in ppm unless
otherwise noted.

City of Peterborough

Survey Sample Results

Table IA

Page I

Otonabee River and Little Lake

SAMPLE POINT NUMBER	DESCRIPTION OF SAMPLING POINTS	DATE	BOD	SOLIDS		PHENOLS IN PPB	BACTERIAL EXAMINATION	
				TOTAL	SUSP		TOTAL	FAECAL
TO 97.0	UPSTREAM OF PETERBOROUGH AT LOCK 23	21/11/68	1.5	198	43		165	42
		20/10/69	2.0	200	10		1100	44
TO 92.3A	WEST SIDE OF RIVER AT PARKHILL ROAD	21/11/68	1.5	156	4		290	46
		20/10/69	1.6	170	10		3600	400
TO 92.5B	EAST SIDE OF RIVER AT PARKHILL ROAD	21/11/68	2.3	212	34		70	0
		20/10/69	1.8	160	5		350	72
TO 92.2	AT LONDON STREET FOOT-BRIDGE	21/11/68	2.1	156	3		30	0
		20/10/69	1.8	130	5		400	74
TO 91.6A	WEST SIDE OF RIVER AT HUNTER STREET BRIDGE	26/11/68	1.0	160	7		90	34
		20/10/69	0.8	130	5		2600	385
TO 91.6B	EAST SIDE OF RIVER AT HUNTER STREET BRIDGE	21/11/68	1.1	166	3		45	0
		20/10/69	1.4	150	10		4500	800
TO 91.2A	WEST SIDE OF RIVER AT C.P.R. BRIDGE	26/11/68	1.2	138	4		70	32
		20/10/69	1.0	140	5		1800	900
TO 91.2B	EAST SIDE OF RIVER AT C.P.R. BRIDGE	26/11/68	1.5	118	2		10	4
		20/10/69	2.5	140	25		4400	2300
TO 90.9A	WEST BANK OF LITTLE LAKE AT NARROWS CHROMIUM (CR) - 0.0	26/11/68	1.5	176	4	6	170	56
		20/10/69	3.0	150	20	5	50000	3200
TO 90.9B	EAST BANK OF LITTLE LAKE AT NARROWS CHROMIUM (CR) - 0.0	26/11/68	1.6	166	4	3	65	18
		20/10/69	1.4	140	5	1	4000	1100

Table IA
Page II

SAMPLE POINT NUMBER	DESCRIPTION OF SAMPLING POINTS	DATE	BOD	SOLIDS		PHENOLS IN PPB	BACTERIAL EXAMINATION	
				TOTAL	SUSP		TOTAL	FAECAL
TO 90.0A	WEST SIDE OF RIVER AT LANSDOWNE STREET	26/11/68	1.7	138	3		50	0
	PHOSPHORUS (P) TOTAL - 0.02	7/ 8/69	1.6	220	5	9	500	200
	SOL - 0.01							
	<u>NITROGEN AS N</u> FREE AMMONIA - 0.2							
	TOTAL KJELDAHL 0.22							
	NITRITE 0.02							
	NITRATE 0.02							
		20/10/69	1.0	160	5		1500	104
TO 90.0B	EAST SIDE OF RIVER AT LANSDOWNE STREET	26/11/68	1.1	163	3		55	10
		20/10/69	1.2	160	5		1800	240
TO 88.5A	WEST SIDE OF RIVER AT HIGHWAY 7 BY-PASS	27/11/68	2.2			4	245	44
	CHROMIUM (CR) - < 0.01							
	CYANIDE (HCN) - < 0.01							
		8/ 8/69	1.6	180	5	2	2400	1000
	ABS - 0.2							
	PHOSPHORUS (P) TOTAL - 0.02							
	SOL - 0.01							
	<u>NITROGEN AS N</u> FREE AMMONIA - 0.3							
	TOTAL KJELDAHL 0.38							
	NITRITE 0.03							
	NITRATE 0.03							
		21/10/69	1.5	230	10	0	6000	4800
TO 88.5B	PH (AT LAB) - 8.1							
	EAST SIDE OF RIVER AT HIGHWAY 7 BY-PASS	27/11/68	2.2	176	8	6	1250	360
	CHROMIUM (CR) - 0.0							
	CYANIDE (HCN) - < 0.01							
		7/ 8/69	1.4	180	5	3	550	164
	<u>NITROGEN AS N</u> FREE AMMONIA 0.5							
	TOTAL KJELDAHL 4.3							
	NITRITE 0.02							
	NITRATE 0.02							
	ABS - 0.0							
	PHOSPHORUS (P) TOTAL - 0.7							
	SOL - 0.1							

Table IA
Page III

SAMPLE POINT NUMBER	DESCRIPTION OF SAMPLING POINTS	DATE	BOD	SOLIDS		PHENOLS IN PPB	BACTERIAL EXAMINATION	
				TOTAL	SUSP		TOTAL	FAECAL
FO-28.5B CONTINUED	ABS - 0.1 PHOSPHORUS (P) TOTAL - 0.09 SOL - 0.03 <u>NITROGEN AS N</u> FREE AMMONIA 0.4 TOTAL KJELDAHL 0.5 NITRITE 0.04 NITRATE 0.02 PH (AT LAB) - 8.2	8/ 8/69 21/10/69	1.4 2.5	190 240	5 50	4 0	1600 1500	600 160

City of Peterborough

Table IB

Page I

Monthly Monitoring Program

Otonabee River at Road to Nassau Mills - TO 95.5

DATE SAMPLED	COLIFORMS/100 ML	DISSOLVED OXYGEN	5-DAY BOD	SOLIDS		PHOSPHORUS AS PO ₄		NITROGEN AS N			
				TOTAL	SUSP	TOTAL	SOLUBLE	AMMONIA	TOTAL KJELDAHL	NITRITE	NITRATE
18/ 1/68	28.	10.0	1.7	122	15	0.17	0.08	0.06	0.52	0.00	0.00
18/ 2/68	4.	15.0	0.4	128	3	0.06	0.03	0.20	0.52	0.00	0.15
18/ 3/68	24.	10.0	2.3	146	15	0.11	0.05	0.13	0.52	0.00	0.28
18/ 4/68	16.	7.0	1.4	129	4	0.12	0.03	0.02	0.34	0.00	0.24
18/ 5/68	24.	9.0	1.8	140	2	0.15	0.02	0.02	0.76	0.00	0.05
11/ 6/68	72.	9.0	0.8	106	5	0.11	0.02	0.06	0.32	0.00	0.02
11/ 7/68	120.	9.0	1.4	158	1	0.08	0.01	0.08	0.25	0.00	0.04
18/ 8/68	368.	8.0	0.8	128	15	0.20	0.14	0.08	0.30	0.12	11.00
12/ 9/68	76.	10.0	1.4	142	9	0.12	0.02	0.07	0.60	0.00	0.02
22/10/68	80.	9.0	0.8	128	8	0.11	0.03	0.03	0.56	0.00	0.02
28/11/68	76.	10.0	1.1	136	3	0.04	0.03	0.05	0.45	0.00	0.02
18/12/68	4.	6.0	2.0	130	5	0.06	0.02	0.05	0.44	0.00	0.10
21/ 1/69	12.	9.0	1.0	150	5	0.03	0.01	0.12	0.64	0.00	0.13
26/ 2/69	20.	3.0	1.6	140	2	0.01	0.01	0.12	0.48	0.00	0.13
7/ 4/69	12.	11.0	1.0	140	3	0.01	0.00	0.10	0.47	0.00	0.19
30/ 4/69	8.	9.0	2.0	150	5	0.04	0.01	0.05	0.49	0.01	0.21
28/ 5/69	4.	9.0	0.8	145	5	0.02		0.03	0.49	0.00	0.09
26/ 6/69	130.	9.0	0.6	140	5	0.03		0.11	0.47	0.00	0.08
28/ 7/69	190.	8.0	2.0	140	5	0.03		0.04	0.75	0.00	0.03
28/ 8/69	180.	9.0	1.2	130	5	0.03		0.04	0.52	0.00	0.01
29/ 9/69	70.	9.0	1.2	120	10	0.03	0.01	0.01	0.40	0.00	0.01

City of Peterborough
Monthly Monitoring Program

Table TR
Page II

Otonabee River at Highway Number 7 Right Side - TO 88.5B

DATE SAMPLED	COLIFORMS/100 ML	DISSOLVED OXYGEN	5-DAY BOD	SOLIDS		PHOSPHORUS AS PO ₄		NITROGEN AS N			
				TOTAL	SUSP	TOTAL	SOLUBLE	AMMONIA	TOTAL KJELDAHL	NITRITE	NITRATE
18/ 1/68	3100.	5.0	1.8	136	15	0.11	0.03	0.13	0.52	0.00	0.10
13/ 2/68	1300.	12.0	0.5	128	1	0.30	0.20	0.26	0.52	0.00	0.10
13/ 3/68	4800.	7.0	1.8	166	15	0.17	0.06	0.45	0.78	0.00	0.90
18/ 4/68	704.	7.0	1.4	146	4	0.25	0.06	0.06	0.36	0.01	0.20
15/ 5/68	2900.	10.0	1.7	154	6	0.34	0.13	0.21	1.29	0.01	0.17
11/ 6/68	364.	10.0	0.8	128	10	0.23	0.19	0.33	0.49	0.09	0.08
11/ 7/68	412.	10.0	1.2	172	6	0.14	0.13	0.19	0.36	0.01	0.12
13/ 8/68	60.	8.0	1.1	140	7	0.76	0.45	0.10	0.00	0.01	0.02
12/ 9/68	152.	10.0	1.5	140	5	0.19	0.09	0.25	0.72	0.01	0.07
22/10/68	180.	9.0	1.4	140	9	0.13	0.01	0.06	0.50	0.01	0.02
25/11/68	9800.	4.0	1.3	158	3	0.26	0.15	0.26	0.56	0.00	0.04
18/12/68	9800.		0.8	130	5	0.23	0.16	0.39	0.64	0.00	0.05
21/ 1/69	5600.	2.0	0.8	150	5		0.06	0.24			0.08
26/ 2/69	6600.	1.0	2.0	140	2	0.04	0.03	0.29	0.68	0.00	0.16
7/ 4/69	2800.	4.0	1.4	140	5	0.07	0.05	0.18	0.33	0.01	0.16
30/ 4/69	1260.	9.0	2.0	150	5	0.04	0.01	0.15	0.55	0.01	0.18
28/ 5/69	4300.	7.0	0.4	150	5	0.04	0.03	0.09	0.44	0.00	0.06
26/ 6/69	1100.	7.0	1.0	150	5	0.75	0.06	0.50		0.01	0.12
28/ 7/69	15400.	7.0	1.6	25	6	0.12	0.09	0.24	0.64	0.04	0.11
28/ 8/69	580.	6.0	1.4	130	5	0.06	0.03	0.18	0.65	0.01	0.02
29/ 9/69	18000.	5.0	2.5	150	5	0.19	0.08	0.39	1.00	0.00	0.01
28/10/69	450.	8.0	2.5	120	5	0.09	0.05	0.21	0.67	.002	0.01
9/12/69	2200.	5.0	6.9	130	5	0.05	0.02	0.10	0.50	.006	0.07

City of Peterborough

Table IB

Page III

Monthly Monitoring Program

Otonabee River at Highway Number 7 Left Side - TO 88.5A

DATE SAMPLED	COLIFORMS/100 ML	DISSOLVED OXYGEN	5-DAY BOD	SOLIDS		PHOSPHORUS AS PO ₄		AMMONIA	NITROGEN AS N		
				TOTAL	SUSP	TOTAL	SOLUBLE		TOTAL KJELDAHL	NITRITE	NITRATE
18/ 1/68	6800.	11.0	2.1	136	15	0.08	0.04	0.13	0.46	0.00	0.00
13/ 2/68	3000.	3.0	0.5	130	1	0.12	0.09	0.26	0.58	0.00	0.15
13/ 3/68	580.	5.0	2.3	150	15	0.13	0.05	0.36	0.58	0.00	0.85
18/ 4/68	208.	3.0	1.9	142	5	0.15	0.02	0.04	0.28	0.01	0.24
15/ 5/68	300.	9.0	2.1	170	4	0.19	0.03	0.07	0.82	0.01	0.16
11/ 6/68	1800.	9.0	0.8	126	5	0.14	0.04	0.13	0.34	0.07	0.06
11/ 7/68	500.	8.0	1.5	190	16	0.20	0.07	0.12	0.51	0.01	0.12
13/ 8/68	76.	10.0	0.9	154	8	0.13	0.10	0.05	0.34	0.00	0.02
12/ 9/68	136.	9.5	1.4	146	5	0.13	0.02	0.04	0.44	0.00	0.02
22/10/68	164.	8.0	0.9	142	8	0.29	0.13	0.24	0.58	0.00	0.02
25/11/68	450.	5.0	1.0	164	10	0.05	0.03	0.05	0.32	0.00	0.07
18/12/68	1900.	5.0	0.6	140	5	0.07	0.02	0.04	0.50	0.00	0.08
21/ 1/69	216.	2.0	0.6	140	5		0.01	0.14			0.09
26/ 2/69	288.	2.0	1.4	190	1	9.91	0.01	0.14	0.54	0.00	0.17
7/ 4/69	312.	7.0	1.4	150	4	0.01	0.00	0.09	0.21	0.00	0.16
30/ 4/69	500.	3.0	1.6	160	5	0.02	0.01	0.05	0.65	0.01	0.20
28/ 5/69	7300.	9.0	0.4	140	5	0.02		0.03	0.40	0.00	0.06
26/ 6/69	2400.	8.0	1.0	190	10	0.05	0.01	0.15	0.45	0.01	0.15
28/ 7/69	39000.	6.0	2.4	50	20	0.12	0.06	0.16	0.68	0.03	0.13
28/ 8/69	2500.	2.0	1.4	140	5	0.04	0.01	0.13	0.61	0.01	0.02
29/ 9/69	10300.	4.0	2.0	130	5	0.08	0.02	0.07	0.60	0.00	0.03
22/10/69	1000.	10.0	2.0	140	15	0.03	0.01	0.02	0.36	.004	0.01
9/12/69	212.	5.0	6.4	130	5	0.02	0.01	0.04	0.47	.008	0.11

All analyses in ppm unless
otherwise noted.

City of Peterborough
Tributaries of the Otonabee River

Table II
Page I

SAMPLING POINT NUMBER	DESCRIPTION OF SAMPLING POINTS	DATE	BOD	SOLIDS		PHENOLS IN PPB	BACTERIAL EXAMINATION	
				TOTAL	SUSP		TOTAL	FAECAL
TOW 94.0	MOUTH OF WOODLAND ACRES CREEK	21/11/68	0.4	306	10		240	84
		20/10/69	3.0	860	530		5600	2700
TOM 93.8	MOUTH OF CREEK FROM MARINA BOULEVARD	21/11/68	0.9	762	18		600	230
		20/10/69	3.0	300	130		2500	1300
TOA 92.8	ASHBURNHAM BROOKE AT TRENT CANAL	21/11/68	3.2	310	9		15	0
		20/10/69	1.0	350	10		2300	244
TOA 92.1	MOUTH OF ASHBURNHAM BROOKE	21/11/68	2.1	348	8		70	10
		20/10/69	7.0	210	50		70000	2000
TOJ 94.4	JACKSON CREEK AT CITY LIMITS	26/11/68	0.9	338	3		105	62
		20/10/69	1.4	290	5		375	120
TOJ 92.3	JACKSON CREEK AT McDONNELL STREET	27/11/68	2.3	356	6		30	28
		22/10/69	2.5	360	25		2000	180
TOJD 92.7	DOWNEY STREET DRAIN AT WOLSEY STREET	27/11/68	9.6	1828	115		14000	132
		22/10/69	18.0	600	60		60000	4800
TOJD 92.1	DOWNEY STREET DRAIN AT JACKSON CREEK	27/11/68	4.9	1296	16		14000	132
		22/10/69	17.0	630	40		70000	6000
TOJ 92.0	JACKSON CREEK AT REID STREET	27/11/68	1.8	536	9		60	0
		22/10/69	5.5	390	20		6500	800
TOJ 91.7	JACKSON CREEK AT HUNTER STREET	27/11/68	2.9	478	9		760	260
		22/10/69	6.0	400	30		8000	2500
TOJ 91.5	JACKSON CREEK AT KING STREET	27/11/68	2.6	510	12		1050	264
		22/10/69	6.5	420	40		8000	2100
TOJ 91.2	JACKSON CREEK AT WOLFE STREET	27/11/68	2.6	530	16		450	14
		22/10/69	7.0	430	40		8800	1500

Table II
Page II

SAMPLING POINT NUMBER	DESCRIPTION OF SAMPLING POINTS	DATE	BOD	SOLIDS		PHENOLS IN PPB	BACTERIAL EXAMINATION	
				TOTAL	SUSP		TOTAL	FAECAL
TOJ 91.1	JACKSON CREEK AT GEORGE STREET	27/11/68	3.4			6	820	350
	CHROMIUM (CR) - 0.08							
	PH (AT LAB) - 6.8							
		21/10/69	3.5	350	10	3	2700	6100
	PH (AT LAB) - 7.6							
TOL 90.6	CREEK FROM MANIECE AVENUE AT ARMOUR ROAD	26/11/68	1.0	498	5		186	154
		20/10/69	3.5	480	10		3500	500
TOM 90.6	MEADE CREEK AT ARMOUR ROAD	26/11/68	1.0	358	2		75	20
		20/10/69	2.0	440	5		2700	600
TOB 90.0	BYERSVILLE CREEK AT LANSDOWNE STREET WEST	27/11/68	7.0	1354	156	8	1300	680
	CHROMIUM (CR) - 0.0							
	PH (AT LAB) - 6.9							
		21/10/69	1.4	410	25	4	3000	2700
	PH (AT LAB) - 8.2							
TOB 88.6	BYERSVILLE CREEK AT OTONABEE RIVER	27/11/68	1.4	504	59		180	35
		21/10/69	2.5	610	70		60000	60000

All analyses in ppm unless
otherwise noted.

City of Peterborough
Municipal Storm Sewer Outfalls

Table III
Page I

SAMPLE POINT NUMBER	DESCRIPTION OF SAMPLING POINTS	DATE	BOD	SOLIDS		PHENOLS IN PPB	BACTERIAL EXAMINATION	
				TOTAL	SUSP		TOTAL	FAECAL
TO 96.6w	ARGYLE STREET STORM SEWER	21/11/68	1.4	758	16		1400	100
		20/10/69	6.0	340	180		74000	2700
TO 91.8w	DOURO STREET STORM SEWER	21/11/68	1.2	1542	6		6500	800
		20/10/69	11.0	180	30		133000	8400
TO 91.6wA	HUNTER STREET STORM SEWER EAST SIDE	21/11/68	8.0	1192	112	10	2500	28
		20/10/69	2.5	150	10	5	7000	150
TO 91.6wB	HUNTER STREET STORM SEWER WEST SIDE <u>NITROGEN AS N</u> FREE AMMONIA - 0.05 TOTAL KJELDAHL 0.6 NITRITE 0.035 NITRATE 0.53	26/11/68	2.5	360	4		65	16
		20/10/69	38.0	560	440		240000+	13000
		21/11/68	5.0	926	25		9200	400
		20/10/69	10.0	190	15	14	31000	10000
		21/11/68	52.0	12598	238	25	650	430
TO 90.7w	MARK STREET STORM SEWER	20/10/69	38.0	240	60	20	87000	29000
		27/11/68	1.2	1032	3		150	2
TOJ 92.5w	BONNACORD STREET STORM SEWER AT JACKSON CREEK	22/10/69	34.0	870	350		7300	2000
		21/10/69	2.0	230	0	3	5000	250
TO 91.3w2	KING STREET STORM SEWER TO OTONABEE RIVER PH (AT LAB) - 6.9	21/10/69	2.0	230	0	3	5000	250
		21/10/69	80.0	310	30	40	70000	144
TO 91.3w1	SHERBROOKE STREET STORM SEWER TO OTONABEE RIVER PH (AT LAB) - 6.7	21/10/69	80.0	310	30	40	70000	144

Table III
Page II

SAMPLE POINT NUMBER	DESCRIPTION OF SAMPLING POINTS	DATE	BOD	SOLIDS		PHENOLS IN PPB	BACTERIAL EXAMINATION	
				TOTAL	SUSP		TOTAL	FAECAL
TO 91.0W	RINK STREET STORM SEWER TO LITTLE LAKE	27/11/68	13.0	362	51		3000	88
		21/10/69	7.0	440	60		0	0
	CHROMIUM (CR) 0.12							
TOJ 91.1W	TOWNSEND STREET STORM SEWER TO JACKSON CREEK	27/11/68	24.0	2458	341		14800	3300
		21/10/69	732.0	350	20		240000+	240000
	CHROMIUM (CR) 0.0							
TO 89.2WR	BRAIDWOOD AVENUE STORM SEWER TO OTONABEE RIVER	27/11/68	88.0	1884	141		37000	10000
	APPARENT COLOUR UNITS - 100.1							
		7/ 8/69	44.0	270	30	30	240000+	240000+
	A.B.S. - 0.4							
TO 89.0W		21/10/69	1300.	4190	500		240000+	61000
	PARK STREET STORM SEWER TO OTONABEE RIVER	27/11/68	21.0	650	121		60000	47000
	CYANIDE (HCN) - 0.01							
		21/10/69	3.0	370	5		3800	200
TO 88.8W	CHROMIUM (CR) - 13.0							
	RIVERSIDE DRIVE STORM SEWER TO OTONABEE RIVER	27/11/68	10.0	294	82	4	315	105
	PH (AT LAB) - 6.9							
	CHROMIUM (CR) - 0.0							
TO 88.7W		7/ 8/69	5.6	230	25	4	240000+	240000+
	A.B.S. - 0.3							
		8/ 8/69	1.8	190	5	7	5400	3200
	A.B.S. - 0.0							
		21/10/69	1.6	220	10	0	240	55
TO 88.7W	PH (AT LAB) - 7.6							
	MONAGHAN ROAD STORM SEWER TO OTONABEE RIVER	27/11/68	25.0	654	239		35000	70
		8/ 8/69	4.8	280	5	2	4600	4100
	A.B.S. - 0							
TOB 90.0W		21/10/69	2.0	310	5		1300	300
	LANDSHOFNE STREET WEST STORM SEWER TO BYERSVILLE CREEK	21/10/69	1.0	260	5	0	450	112
	PH (AT LAB) - 6.5							

All analyses in ppm unless
otherwise noted.

City of Peterborough
Industrial Waste Outfalls

Table IV
Page I

SAMPLE POINT NUMBER	DESCRIPTION OF SAMPLING POINTS	DATE	BOD	SOLIDS		PHENOLS IN PPB	BACTERIAL EXAMINATION	
				TOTAL	SUSP		TOTAL	FAECAL
TO 91.6 I ₁	QUAKER OATS COMPANY SOUTH OUTFALL	26/11/68	1.9	158	9		18400	800
	<u>NITROGEN AS N</u> FREE AMMONIA 0.04							
	TOTAL KJELDAHL 0.4							
	NITRITE 0.01							
	NITRATE 0.05							
		20/10/69	6.5	120	10		105000	95000
TO 91.6 I ₂	QUAKER OATS COMPANY MIDDLE OUTFALL	26/11/68	0.5	126	2		65	12
	<u>NITROGEN AS N</u> FREE AMMONIA 0.1							
	TOTAL KJELDAHL 1.6							
	NITRITE 0.005							
	NITRATE 0.10							
		20/10/69	2.0	120	5		2400	102
TO 91.6 I ₃	QUAKER OATS COMPANY NORTH OUTFALL	26/11/68	0.5	254	2		85	6
	<u>NITROGEN AS N</u> FREE AMMONIA 0.02							
	TOTAL KJELDAHL 1.4							
	NITRITE 0.005							
	NITRATE 0.73							
		20/10/69	1.0	160	5		4000	90
TOJ 91.1 P	KAWARTHA CAR WASH OUTFALL TO JACKSON CREEK A.B.S. - 18.6	21/10/69	25.0	910	110	7	5700	2500

All analyses in ppm unless
otherwise noted.

City of Peterborough
Municipal Sewer Outfalls

Table V
Page I

SAMPLE POINT NUMBER	DESCRIPTION OF SAMPLING POINTS	DATE	BOD	SOLIDS		PHENOLS IN PPB	BACTERIAL EXAMINATION	
				TOTAL	SUSP		TOTAL	FAECAL
TO 88.9 T	PETERBOROUGH SEWAGE TREATMENT PLANT EFFLUENT TO OTONABEE RIVER	27/11/68	5.8	404	10	10	70000	65000
	CHROMIUM (CR) - 0.1							
	PH (AT LAB) - 6.9							
	PH (AT LAB) - 7.9	21/10/69	2.5	390	10	10	350	100
TO 89.0 R	PARK STREET EMERGENCY SEWAGE PUMPING STATION OUTFALL - SURFACE DISCHARGE	7/ 8/69	4.4	340	5	6	7200	1500
	A.B.S. - 0.2							
TO 89.0 R	OVERFLOW OF SEWAGE FROM SANITARY SEWER SOUTH OF PARK STREET EMERGENCY SEWAGE PUMPING STATION (VIA SUBMERGED PIPE)	7/ 8/69	62.0	510	90	70	240000+	240000+



96936000009296